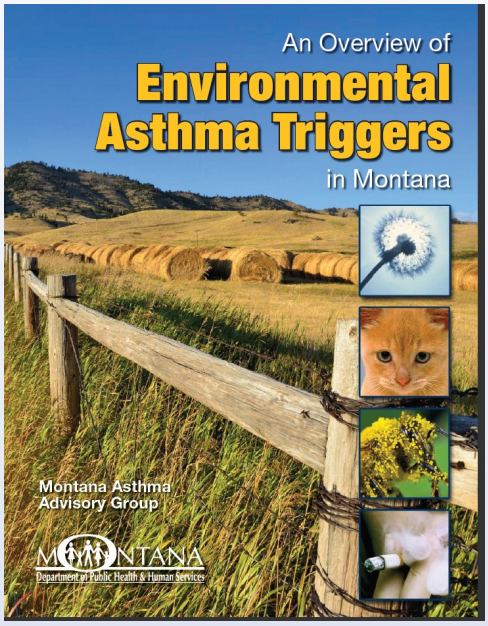
MONTANA

CHRONIC DISEASE PREVENTION AND HEALTH PROMOTION BUREAU

Chronic Disease Surveillance Report

Asthma Triggers in Montana: A Consensus



Presence of Asthma Triggers in Montana

The geography and climate in Montana make the potential for exposure to common asthma triggers different from other locations. Starting in October 2010, the Montana Asthma Control Program (MACP) coordinated a group of stakeholders to fully assess and identify the asthma triggers that are of importance to Montanans. More specifically, the report focuses on *environmental* asthma triggers, which, for the purposes of the report, were defined as asthma triggers which one may be exposed to specifically in the indoor or outdoor environment, or in the workplace. Although respiratory infections acquired via the environment are significant asthma triggers the topic of respiratory infections is beyond the scope of this report.

The report contains chapters addressing:

- Indoor triggers
- Outdoor triggers
- Asthma triggers in the workplace
- Research needs
- Policy
- Clinical recommendations

The full report can be found at:
http:\\dphhs.mt.gov/asthma

Factors Unique to Montana

Many comprehensive research studies on asthma triggers have taken place in large, urban cities located at low elevation with varying humidity. Montana has a lower population density, larger geographic area, higher elevation, and drier climate than many places in which asthma trigger research has taken place. All of these factors affect the distribution and prevalence of asthma triggers in the state.

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Indoor Triggers

The Environmental Asthma Triggers in Montana report outlines the common indoor triggers, their presence in Montana and their primary associations (Table 1).

Table 1. Indoor asthma triggers, Montana

Trigger	Present in MT	Associated with:
Tobacco smoke	Yes	Tobacco use
$PM_{2.5}$ or PM_{10}	Yes	Wood stoves
Mold	Yes	Indoor dampness
Furry and feathered pets	Yes	Pets that spend time indoors, especially in bedrooms and on carpets
Nitrogen dioxide	Yes	Unvented gas stoves or fireplaces
Dust mites	Limited	Carpets, bed linens, stuffed animals
Rodents	Yes	Unsanitary indoor environments (can affect any home)
Cockroaches	Very limited	Warm, humid climates
Ozone	Yes	Ionizing air purifiers, copy machines
Volatile Organic Compounds	Yes	Strong fragrances, new furnishings and finishes, some air fresheners

Table 2. Outdoor asthma triggers, Montana

Trigger	Present in MT	Associated with:
$PM_{2.5}$ or PM_{10}	Yes	Wildfires, wood stoves, western Montana valleys during atmospheric inversion conditions
Wildfires	Yes	Summer months during wildfire season
Cold air	Yes	Winter, low temperatures
Pollen	Yes	Spring, summer, and fall seasons, areas with juniper, alder, birch, poplar, ash, and maple trees, areas with grass and weeds
Sulfur dioxide	Limited	Fossil fuel combustion, especially combustion associated with industry
Nitrogen dioxide	Yes	Wildfires, air pollution
Ozone	Limited	Air pollution

Tobacco smoke– particularly environmental tobacco smoke (ETS), may contribute to asthma development in certain populations and is a trigger for asthma exacerbations. Forty-three percent of 8th, 10th, and 12th grade students reported having been exposed to ETS in a room in the previous 30 days in 2008.

Particulate matter ($PM_{2.5}$ or PM_{10})– particles suspended in the air (liquid and solid) that can reach deep in the lung during inhalation. Concentrations can often be higher indoors than outdoors. Wood stoves and fireplaces can be sources of PM and an estimated 28% of Montana adults with asthma report using wood stoves or fireplaces to heat their home. Newer, EPA-certified, wood stoves significantly reduce the amount of emissions released.

Mold– can act as an allergen or as an irritant to people with asthma. Conditions that allow mold growth can be present in Montana depending on the building upkeep, use of heating, ventilation, dehumidifiers and air conditioning systems. In a survey of Montanan adults with asthma, 10% reported having seen mold in their home in the last 30 days. However, not all mold is visible, so the prevalence is likely an underestimate.

Furry and feathered pets– pet dander can act as an allergen and asthma trigger. Pet ownership in Montana is common with an estimated 2/3 of Montanans with asthma owning indoor feathered or furry pets. An estimated 40% of Montana children with asthma sleep with their family's pet. Furthermore, studies have found that pets are so ubiquitous around the US that pet allergens tend to be found in almost all homes, even those with no pet present.

Nitrogen Dioxide– gas formed during combustion. Even small doses of nitrogen dioxide can increase airway reactivity in people with asthma. In Montana, about 25% of adults with asthma use gas to cook; however only 4% of adult Montanans with asthma use an unvented gas stove or fireplace.

Dust mites– because of the high elevation and low relative humidity, the presence of dust mites in Montana is low. Studies in the region have detected dust mite allergen, albeit, at very low levels. However, people with asthma in Montana have been noted to be sensitized to dust mite allergen.

Rodents– rodent allergen can be an asthma trigger and a variety of rats and mice are known to live in the state. About 7% of adults with current asthma reported seeing rodents in their home in the last 30 days, though rodents may be present even when not visible.

Cockroaches– cockroach droppings and saliva act as an allergen. Cockroaches are not common in Montana and are not likely to be a significant asthma trigger for those living in the state. In fact, very few Montana adults with current asthma reported having seen a cockroach in their home.

Other indoor triggers– There are no data to indicate that levels of ozone and volatile or organic compounds (VOCs) in Montana are different from other locations in the US.

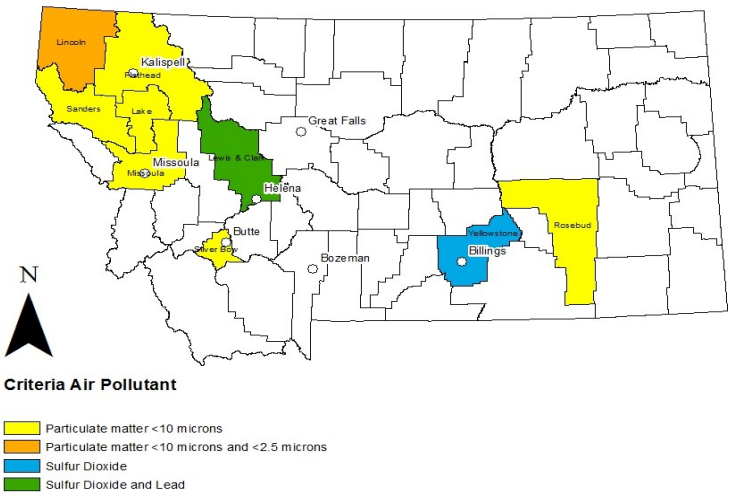
Outdoor Triggers

See Table 2 for common outdoor asthma triggers, their presence in Montana and their common associations.

$PM_{2.5}$ or PM_{10}– criteria pollutant regulated by the EPA. Ten areas in Montana are designated nonattainment areas for particulate matter (Figure). $PM_{2.5}$ is produced by wildfires and woodstoves. About 28% of adults with current asthma in Montana report using a wood stove or fireplace. The use of EPA-certified stoves can reduce the amount of smoke exposure.

Wildfires– the length of the average wildfire season in Montana is getting longer.

Figure. Nonattainment areas for criteria air pollutants, Montana, 2011



Cold air– cold, dry air can cause bronchoconstriction in susceptible individuals often in conjunction with exercise. Cold air can contribute to atmospheric inversions in western Montana that lead to air pollutants being trapped at ground level. However, there is no concrete link between inversions and exacerbations of asthma.

Pollen– tree, grass, and weed pollen are common allergens in Montana. There are limited data on how many Montanans with asthma are also allergic to pollen, however, a recent survey conducted among people with asthma in western Montana indicated that more than 50% of the respondents experience respiratory problems due to airborne pollen in the springtime.

Sulfur dioxide– formed during the combustion of coal and petroleum. Short term exposure has been linked to respiratory tract irritation and the effect can be more pronounced when the individual is exposed to dry, cold air. There are two nonattainment areas in Montana for sulfur dioxide (Figure).

Nitrogen dioxide– produced mostly by vehicles, certain industries and wildfires. Reducing vehicular traffic in large urban areas has been linked to decreased asthma symptoms, which may partially be due to NO_2. There are no nonattainment areas in Montana for nitrogen dioxide, and exposure risk in Montana is low.

Ozone– primary component of photochemical smog caused by vehicles, industries, and power plants that can lead to respiratory irritation. There are no nonattainment areas in Montana for ozone and ozone is not considered a pollutant of concern in Montana.

Research Needs Identified

- **Dust mites**-Studies on the prevalence of dust mite sensitization and exposure in Montana.
- **Dampness (mold)**-Research on what specific factors related to dampness exacerbate asthma and how that relates to the environment in Montana.
- **Wood stoves**-Research examining whether the use of EPA-certified wood stoves decreases asthma exacerbations in the indoor environment.
- **Inversions**-The scope and specific types of health effects of inversions should be studied.
- **Wildfires**-Research is needed to try to quantify the number of people with asthma affected by wildfires in Montana.
- **Work-related asthma**- Research to determine the prevalence and health impact of work-related asthma.

Policy Implications

- Continued support for the Clean Indoor Air Act to increase the number of school districts that adopt comprehensive, tobacco-free policies and in landlord endorsed smoke-free multi-unit housing policies.
- Continued regulation of outdoor air pollution though the Clean Air Act.

Clinical Recommendations

- Patient asthma trigger management should be done on a case-by-case basis.
- Indoor asthma triggers should be managed using a multifaceted approach.
- Counsel patients on the negative effects of smoking and ETS and recommend cessation resources.
- Advise patients to avoid outdoor exercise when outdoor air quality is poor, like during wildfires and cold weather inversions.
- Ask patients about potential work-related asthma trigger exposures. For complicated and/or difficult cases, consider consulting with an occupational and environmental medicine physician.

Report Highlights: Asthma Triggers in Montana

- Features that make Montana unique for asthma triggers
- Information on prevalence of common asthma triggers in Montana
- Research needs, policy considerations, and clinical recommendations around asthma triggers

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